March 7, 1967 H. S. CLOYD ETAL 3,307,504

PALLET

Filed Dec. 1, 1965 4 Sheets-Sheet 1

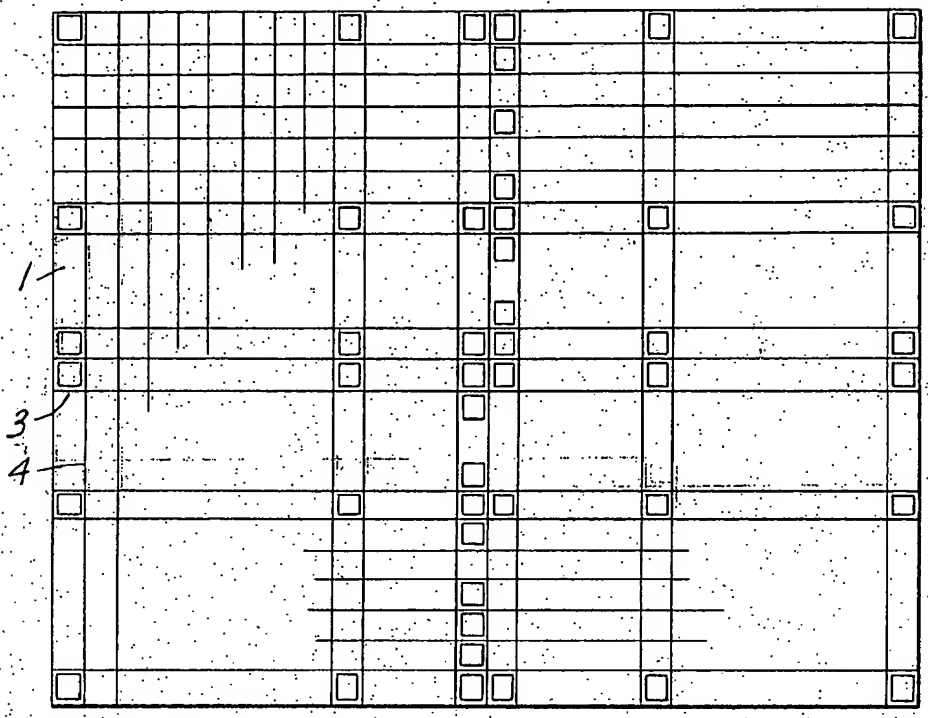

FIG. 1

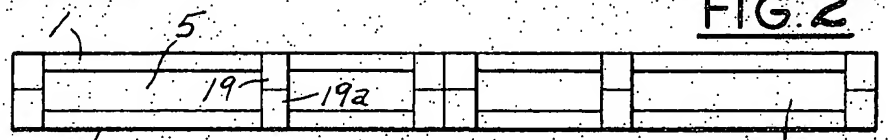

FIG. 2

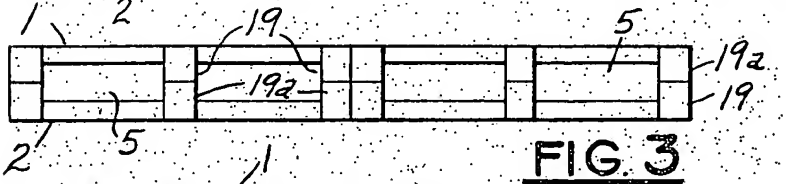

FIG. 3

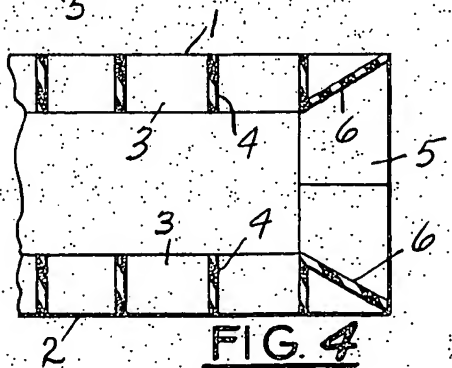

FIG. 4

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March 7, 1967 H. S. CLOYD ET AL 3,307,504

PALLET

Filed Dec. 1, 1965 4 Sheets-Sheet 2

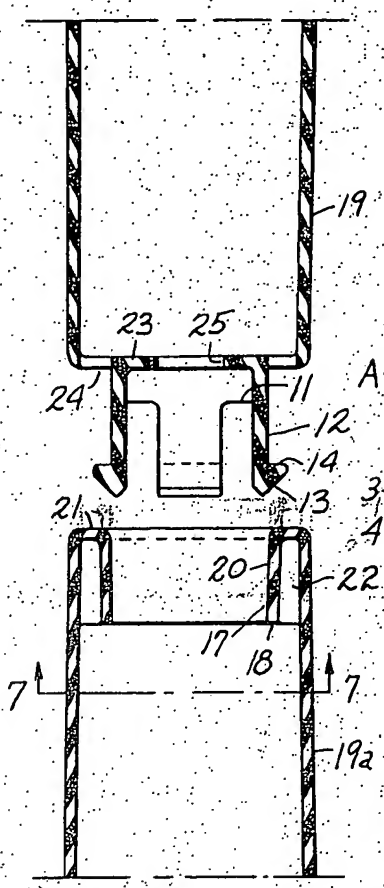


FIG. 5

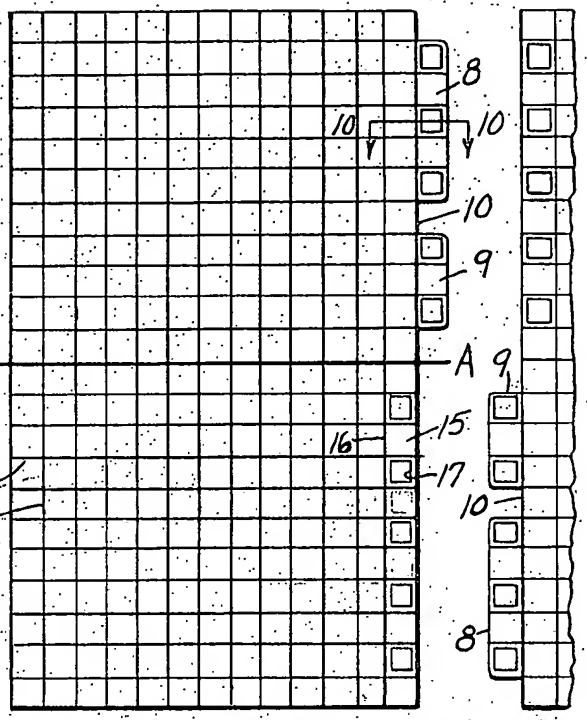


FIG. 8

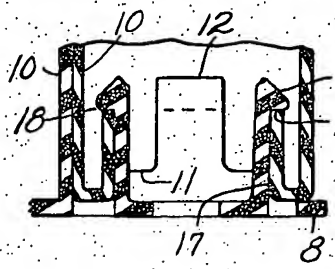


FIG. 10

FIG. 9

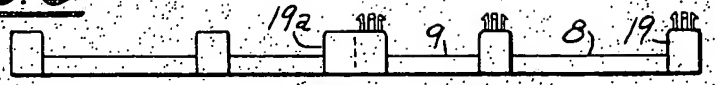


FIG. 6

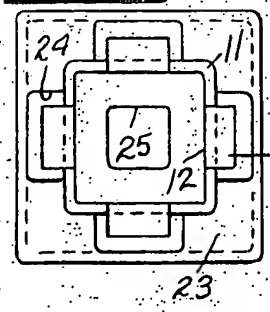
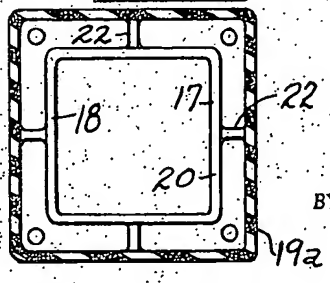


FIG. 7



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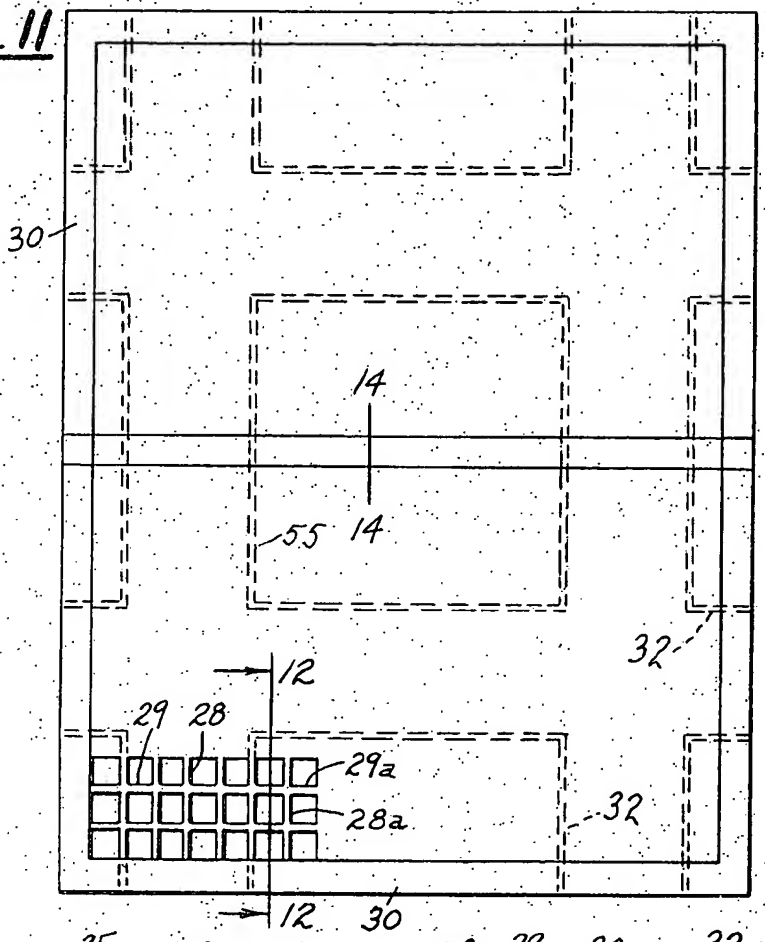
PALLET

Filed Dec. 1, 1965 4 Sheets-Sheet 3

FIG. 11



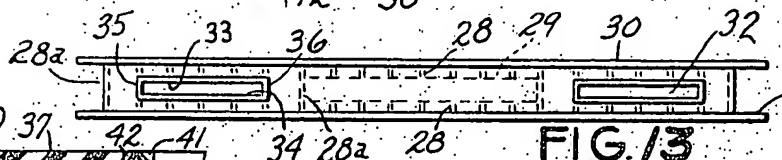
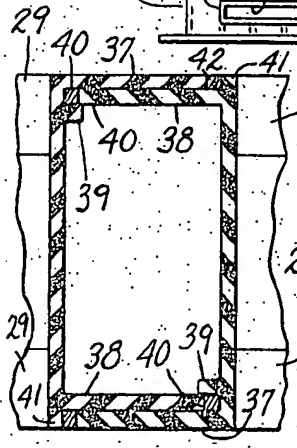


FIG. 13



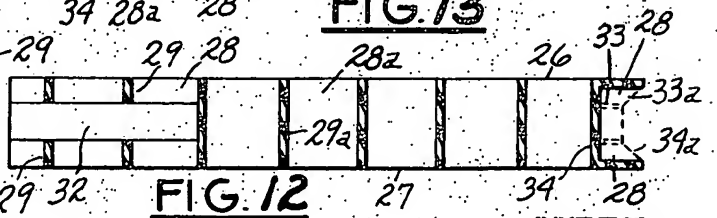


FIG. 12

FIG. 14

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March 7, 1967 H. S. CLOYD ETAL 3,307,504

PALLET

Filed Dec. 1, 1965 4 Sheets-Sheet 4

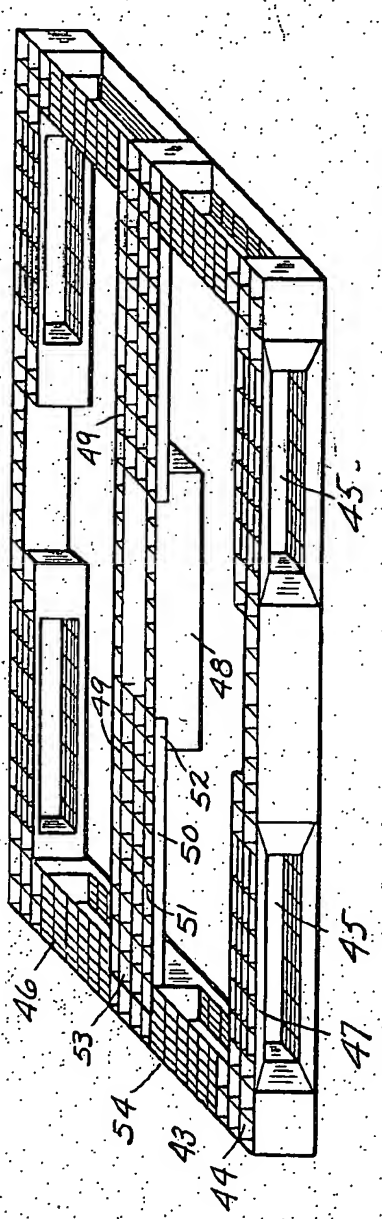

FIG. 15

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3,307,504

PALLET

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Filed Dec. 1, 1965, Ser. No. 510,790
10 Claims. (Cl. 108—58)

This invention is a plastic pallet of particular advantage in food processing and other industries where foreign matter cannot be tolerated. In the preferred form, the pallet is molded of identical parts which are assembled together. From one aspect, the pallet consists of right and left sections arranged so that when one of the sections is inverted and placed in juxtaposition to the other section, there are parts which meet in overlapping relation and are secured together. Each of the right and left sections in turn may be made of two plastic parts assembled back to back and forming respectively the upper and lower faces of the pallet. By this construction, pallets of high strength can be easily made in low cost molds.

In the drawing, FIG. 1 is a top plan view of a pallet, FIG. 2 is an edge view from one side of the pallet, FIG. 3 is an edge view from a side of the pallet at right angles to the first side, FIG. 4 is a section through one of the fork entry openings of the pallet, FIG. 5 is an exploded view of one of the connections between upper and lower parts of the pallet, FIG. 6 is a top view of the male connecting element, FIG. 7 is a section on line 7—7 of FIG. 5, FIG. 8 is a plan view of one of the molded plastic parts and of the edge of an adjacent part in position for assembly, FIG. 9 is an edge view of one of the FIG. 8 parts, FIG. 10 is a section through the connection between side by side parts of the pallet, FIG. 11 is a top plan view of a modification of the pallet, FIG. 12 is a section on line 12—12 of FIG. 11, FIG. 13 is an edge view of the pallet from one side, FIG. 14 is a section on line 14—14 of FIG. 11, and FIG. 15 is a bottom perspective of another modification.

Referring first to FIGS. 1–4, the work supporting elements of the pallet comprise upper and lower grids or lattices 1 and 2, each comprising intersecting longitudinal and cross ribs 3 and 4 edgewise to the load supporting surface. The ribs 3 and 4 are united or integral with each other at their intersections. This construction provides a load supporting surface integral with the upper edges of the ribs 3, 4 and of the required strength and rigidity which is easily molded and easily kept clean. The upper and lower load carrying elements are symmetrical so that the pallet may be inverted. The load carrying surfaces are uniform in all directions so the pallet does not have to be oriented in any particular direction for traveling on conveyors. These features simplify the use of the pallet with automatic loading equipment.

When viewed edgewise from any of the four sides, the pallet presents fork entry openings 5 between the upper and lower load carrying surfaces. FIG. 2 shows the fork entry openings 5 from one side, and FIG. 3 shows the fork entry openings from an adjoining side. The edges of the pallet opposite those shown in FIGS. 2 and 3 would present the same fork entry openings. When the forks enter the openings, the load is transferred from the uppermost load carrying surface directly to the forks so the pallet is not subjected to large bending or twisting loads. As shown in FIG. 4, a section through one of the fork entry openings, tapered upper and lower walls 6 are molded integral with the edges of the load carrying elements 1 and 2 and serve to guide the forks into the opening.

In the preferred form illustrated, the pallet is made of four identical plastic molded parts having features shown in FIGS. 5 through 10 inclusive. By making the pallet

out of four identical parts, the cost of the mold is materially reduced and the size of the molding machine required to produce the part is also materially reduced. When the parts are assembled, two of the plastic parts assembled side by side constitute the load carrying element 1 and the other two of the plastic parts assembled side by side constitute the load carrying element 2. The elements 1 and 2 are assembled back to back.

Each of the plastic parts as shown in FIG. 8 has above centerline A—A offset tabs 8 and 9 integral with the lower or inner edge of rib 10. Upstanding from the tabs 8 and 9 are square or other non-circular projections 11 (FIG. 10) having at the upper edge spring fingers 12 with cam faced ends 13 merging into outwardly facing locking shoulders 14. Below the centerline A—A is a wall 15 integral with the lower edge of ribs 10 and 16 containing sockets 17 positioned to receive the projections 11–14 of a plastic part identical with that shown in FIG. 8 but rotated 180° about an axis perpendicular to its load carrying surface. The edge of this adjoining plastic part is shown adjacent the right hand edge of FIG. 8. When two of the panels are placed side by side as indicated in FIG. 8 and the projections 11–14 are seated in the sockets 17, the parts are firmly secured together in side by side relation by the connections illustrated in greater detail in FIGS. 5–7 and 10.

In the assembled position, the two ribs 10, 10 are in juxtaposition as shown in FIG. 10, imparting stiffness to the assembly. The projections 11 on the tabs 8, 9 fit in the non-circular sockets 17 in the wall 15 between ribs 10 and 16. The cam faced ends 13 of the spring fingers 12 are cammed inward as the projections 11 are inserted in the sockets 17 and upon reaching the assembled position, snap outward, bringing the abrupt shoulders 14 into engagement with the abrupt shoulders 18 at the upper ends of the sockets 17. If the inherent resilience of the spring fingers 12 is not adequate to bring the spring fingers into the locking or holding position, the fingers may be forced outward by a suitable tool which may place the fingers under slight tension to insure positive gripping. If dissasembly were necessary, a suitable tool could engage the cam surfaces 13 and cam the spring fingers 12 inward until the shoulders 14 were clear of the shoulders 18. By this arrangement, one of the load carrying elements 1, 2 can be made from two plastic parts by merely rotating one of the plastic parts 180° about an axis transverse to the load carrying surface of that part.

To complete the assembly of the pallet, one side by side assembly of two plastic parts is inverted and secured back to back to another side by side assembly.

To permit the back to back attachment of the molded plastic parts, on the inner or under side of each of the parts is molded a series of projections 19 and 19*a*, the projections being symmetrically disposed about the centerline A—A. The projections 19 carry, for example, the male fastening elements 11–14 and the projections 19*a* carry the female fastening elements 17–18. In each case, the projections 19, 19*a* are in substantial direct continuation of the ribs 3, 4 to facilitate molding. The height of the projections 19, 19*a* is such that when arranged back to back as shown in FIGS. 2, 3, the upper and lower load carrying elements 1, 2 are spaced apart a distance adequate to receive the forks of a fork lift truck. From one aspect, the projections 19*a* are mirror images of the projections 19 about the axis A—A. It is not necessary that the male fastening elements be located entirely on the projections 19 and the female fastening elements be located entirely on the projections 19*a*. It is necessary that the male fastening element on one of the projections mate with its female counterpart when the plastic parts are assembled back to back.

FIGS. 5–7 are details illustrating the fastening connections and the manner of molding. FIG. 7 and the lower part of FIG. 5 show the socket element 17 arranged at the lower end, for example, of one of the projections 19*a*. For ease of molding, the socket element 17 comprises a tubular wall 20 upstanding from the bottom wall 21 of the socket and connected to the side walls of the socket by reinforcing ribs 22. FIG. 6 and the upper part of FIG. 5 show the male fastening element 11–14 integral with the bottom wall 23 of a projection 19. Openings 24 and 25 are provided in the bottom wall 23 to facilitate molding. The assembly is similar to FIG. 10.

While the projections 11 and the sockets 17 are preferably non-circular, that is not necessary since each of the plastic parts has a plurality of fastening elements for integrally joining the parts. Snap fasteners are preferred, but permanent fastening such as riveting, welding or adhesives could be used.

In the modification of FIGS. 11–14, the pallet has rectangular upper and lower load carrying surfaces 26 and 27, each comprising a grid of intersecting longitudinal and cross ribs 28 and 29 presented edgewise to the load supporting surfaces. The load supporting surfaces are bordered or framed by upper and lower peripheral flanges 30, 31 which facilitate movement of the pallets on conveyors.

Each of the four edges of the pallet has two fork entry openings 32 positioned as shown in FIG. 11, and having the construction shown in FIGS. 12 and 13. The symmetrical disposition of the fork entry openings permits the pallet to be approached by a fork lift truck from any side. At the entrance end, each fork entry opening is defined by upper and lower walls 33 and 34 parallel to the upper and lower flanges 30 and 31 and vertical side walls 35 and 36 perpendicular to the flanges 30 and 31. The walls 33 and 34 are in substantial direct continuation of the inner edges of the longitudinal and cross ribs 28 and 29 of the load carrying sections. The vertical walls 35, 36 of the pallet openings are in substantial direct continuation of the ribs 28 or 29, depending upon the edge at which the pallet opening is located. In FIG. 13, the walls 35 and 36 are in direct continuation of longitudinal ribs 28. In fork lift openings in an adjoining edge of the pallet, the walls 35 and 36 would be in direct continuation of cross ribs 29. The walls 33, 34 terminate inward of the outer edge of the flanges 30, 31 and the outer ends 33*a*, 34*a* of the longitudinal (or cross) ribs are tapered to facilitate fork entry. As additional reinforcement, ribs 28*a* and 29*a* adjacent the fork lift openings preferably extend the full depth of the pallet. Throughout the balance of the pallet, the ribs 28 and 29 have a depth sufficient to carry the load but do not extend the full depth of the pallet.

The pallet is made of two identical plastic parts which are assembled by inverting one of the parts and connecting it in side by side relation to the other part. As shown in FIG. 14, each of the plastic parts has at one edge upper and lower flanges 37 and 38. The flange 37 is in direct continuation of the load carrying edges of the ribs 28, 29. The flange 38 is offset inwardly from the load carrying edges of the ribs 28 and 29. Below the flange 37 is a short rib 39 providing a pocket for a bead 40 of fusible plastic. Referring to FIG. 14, when the right molded part is inverted and assembled in side by side relation to the left part, the flanges 37 overlap the flanges 38 and the outer edges of the flanges 38 close the pocket containing the bead 40 of fusible plastic such as a mixture of plastic and metallic particles which can be heated by induction heating. When so assembled there is also a pocket between the outer edge of each flange 37 and an upstanding rib 41 which receives a bead 42 of fusible plastic. After the parts are assembled, the plastic is heated by induction currents and seals the plastic parts together. This provides a box frame construction making a rigid connection between the assembled plastic parts. By making the pallet of two identical plastic parts, assembled side by side, the mold cost is materially reduced.

In addition to the fusible plastic beads 40, 42, other fastening constructions may be used to fasten together the overlapping flanges 37, 38, such as adhesives, welding, heat sealing, mechanical fastening connections. As in the FIGS. 1–10 construction, the FIGS. 11–14 pallet comprises two identical plastic parts symmetrical about a center line of the pallet and each having offset sections which mate in overlapping relation when one of the parts is inverted and placed in side by side juxtaposition to the other part, and means for fastening or integrally joining said offset sections together.

In the modification of FIG. 15, the upper surface of the pallet (not shown) is the same grid of longitudinal and cross ribs edgewise to the load supporting surfaces used in FIG. 1. The under side of the pallet is bordered by a frame of intersecting longitudinal and cross ribs 43, 44 which extend edgewise the full depth of the pallet except for the fork lift openings 45 on the edges of the pallet. This provides a rigid frame which stiffens the upper surface of the pallet which over a large part of its area has ribs of lesser depth such as shown in FIG. 4. The full depth ribs are conveniently extensions of the ribs forming the upper surface of the pallet. In the region of the fork lift openings 45, additional ribs 46, 47 may be interpersed to maintain the stiffness with ribs of lesser depth. To provide additional stiffness in the lengthwise direction, an additional rectangular frame or island 48 of full depth ribs is provided and grids 49 of longitudinal and cross ribs 50, 51, each have one end 52 fastened to one end of the island 48 and the opposite end 53 fastened to the adjacent end frame 54. The grids 49 tie the end frame 54 to the island 48.

The FIG. 15 pallet is made in three pieces, two grids 49 and a single large piece comprising the balance of the pallet. These pieces may be molded at the same time. All of the pieces are easy to mold. The ribs which form the upper load carrying surface and associated full depth ribs which provide a stiffening frame are edgewise to the load carrying surface and are easily formed by cores normal to the surfaces. The same is true of the ribs forming the grids 49. The fork entry openings 45 are formed by cores parallel to the load carrying surface of the pallet but these cores are relatively short and are easily retracted before the mold is opened. If the grids 49 were molded integral with the balance of the pallet, the core necessary to provide the fork entry openings would be excessively long, since passageways registering with the fork entry openings 45 must extend the full length or width of the pallet in order that the fork may approach the pallet from either side or end.

The FIG. 15 pallet may obviously be made in several pieces integrally joined or connected together as in the FIG. 1 and FIG. 11 pallets.

In FIG. 11, the island 55 at the center is similar to the island 48 and would usually have full depth ribs 28*a* and 29*a* around the periphery of the island bordering the fork entry passageways 32 and ribs 28, 29 of lesser depth at the center of the island. The ribs 28*a* and 29*a* are in substantial direct continuation of the ribs 28 and 29. From one aspect, the ribs 28*a*, 29*a* are the ribs 28, 29 with depending extensions which provide additional support for the center of the pallet. Splitting the pallet into two pieces reduces the length of the core forming the fork entry passageway lengthwise of the pallet.

What is claimed as new is:

1. A plastic pallet having an upwardly presented load carrying surface integral with the upper edges of a lattice of a plurality of ribs individually presented edgewise to said surface and intersecting each other at a plurality of intersections, said ribs being united to each other at the intersections and forming openings between the intersections normal to said surface, peripheral support means for

the lattice comprising a rectangular frame joined integrally with the periphery of the lattice and having spaced fork entry passageways for receiving the forks of a lift truck, the lower edges of ribs of said lattice being adapted to overlie the forks when received in said passageways and to transfer to the forks the load carried by said load carrying surface.

2. The pallet of claim 1 in which the lattice comprises two identical plastic parts symmetrical about a center line of the pallet and each having offset sections which mate in overlapping relation when one of the parts is inverted and placed in side by side juxtaposition to the other part, and means for fastening said offset sections together.

3. The structure of claim 2 in which the means for fastening the offset sections together comprises projections on one of the sections and socket portions in the mating section receiving the projections.

4. The pallet of claim 1 having additional support means at the center of the lattice between said passageways comprising depending extensions of the ribs of said lattice.

5. The pallet of claim 1 having additional support means at the center of the lattice between said passageways comprising depending extensions of the ribs of said lattice and reenforcing members at the bottom of said pallet extending between said center and peripheral support means.

6. The pallet of claim 1 in which the lattice comprises two identical plane rectangular lattices of intersecting ribs at right angles to each other and to the sides of the pallet and edgewise to the plane of the lattices, said lattices having side ribs which are brought into juxtaposition when

one of the lattices is rotated 180° about an axis perpendicular to its plane, each part having male and female fastening elements engaged as said side ribs are brought into juxtaposition.

7. The pallet of claim 3 in which the projections have spring fingers with catches which snap into engagement with the socket portions.

8. A plastic pallet comprising upper and lower lattices of a plurality of ribs individually presented edgewise and intersecting each other at a plurality of intersections with the edges of the ribs forming respectively the upper and lower faces of the pallet, means uniting the upper and lower lattices and holding them in spaced relation to each other to provide space between the lattices for fork entry.

9. The pallet of claim 8 in which the means uniting the lattices comprises projections on the inner faces of the lattices in substantially direct continuation of the ribs.

10. The pallet of claim 1 in which the load carrying surface consists essentially of the upper edges of the intersecting ribs.

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